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Patent

UNITED STATES DESIGNATED/ELECTED OFFICE
SUBMISSION UNDER 35 U.S.C. 371

Applicant:	Boyadjieff et al	§	
		§	Art Unit:
Int'l App. No:	PCT/GB2003/004417	§	
		§	Examiner:
Filed:	5 April 2005	§	
		§	Atty Docket No: DQ 001 PCT/US
For:	Apparatus & Method For	§	
	Transmitting A Signal From	§	
	Deep In A Wellbore Through	§	
	A String Of Tubulars	§	

EXTRA SET CLAIMS (CLAIM 1 - 20) - FOR PTO EXAMINER

Claims:

1 1. (new) An apparatus for transmitting a signal from deep in a wellbore
2 through a string of tubulars said apparatus comprising a signal conductor and a tubular
3 characterized in that said signal conductor is located adjacent an interior surface of
4 said tubular.

1 2. (new) The apparatus of claim 1 wherein said signal conductor is an
2 electrical conductor.

1 3. (new) The apparatus of claim 2 wherein said electrical conductor is
2 isolated from said interior surface of said tubular by a layer of electrically insulative
3 material.

1 4. (new) The apparatus of claim 3 wherein said interior surface of said tubular
2 is coated in said insulative layer.

1 5. (new) The apparatus of claim 1 wherein said signal conductor is a wire
2 embedded in a protective layer.

1 6. (new) The apparatus of claim 2 wherein said electrical conductor is foil and
2 a protective layer covers said foil.

1 7. (new) The apparatus of claim 2 wherein said electrical conductor comprises
2 a micro strip line.

1 8. (new) The apparatus of claim 6 wherein said micro strip line comprises a
2 conductive core and an insulating layer encasing said conductive core.

1 9. (new) The apparatus of claim 8 wherein said insulating layer is encased in
2 an outer conductive layer.

1 10. (new) The apparatus of claim 1 wherein said signal conductor extends
2 substantially the entire length of said tubular.

1 11. (new) The apparatus of claim 1 further comprising a plurality of signal
2 conductors including a first signal conductor and a second signal conductor, the first
3 signal conductor carrying a signal and the second signal conductor carrying
4 substantially the same signal.

1 12. (new) The apparatus of claim 1 wherein said signal conductor is provided
2 with means for transferring said signal from said signal conductor to another signal
3 conductor in an adjacent tubular.

1 13. (new) The apparatus of claim 1 wherein said signal conductor is provided
2 with an antenna at at least one end of said tubular.

1 14. (new) The apparatus of claim 1 wherein a receiving antenna is provided
2 at one end of said tubular and a transmitting antenna is provided at the other end of
3 said tubular, said signal conductor arranged therebetween.

1 15. (new) The apparatus of claim 1 further comprising an amplifier-receiver.

1 16. (new) The apparatus of claim 15 wherein said amplifier-repeater comprises
2 a signal amplifier and a power source.

1 17. (new) The apparatus of claim 16 wherein said power source comprises a
2 piezoelectric device.

1 18 (new) The apparatus of claim 1 wherein said signal conductor is arranged
2 in a recess in said interior wall of said tubular.

1 19 (new) The apparatus of claim 1 wherein said tubular is drill pipe.

1 20. (new) A method for transmitting a signal from deep in a wellbore through
2 a string of tubulars, the method comprising passing said signal through an electrical
3 conductor located adjacent an interior surface of said tubular.

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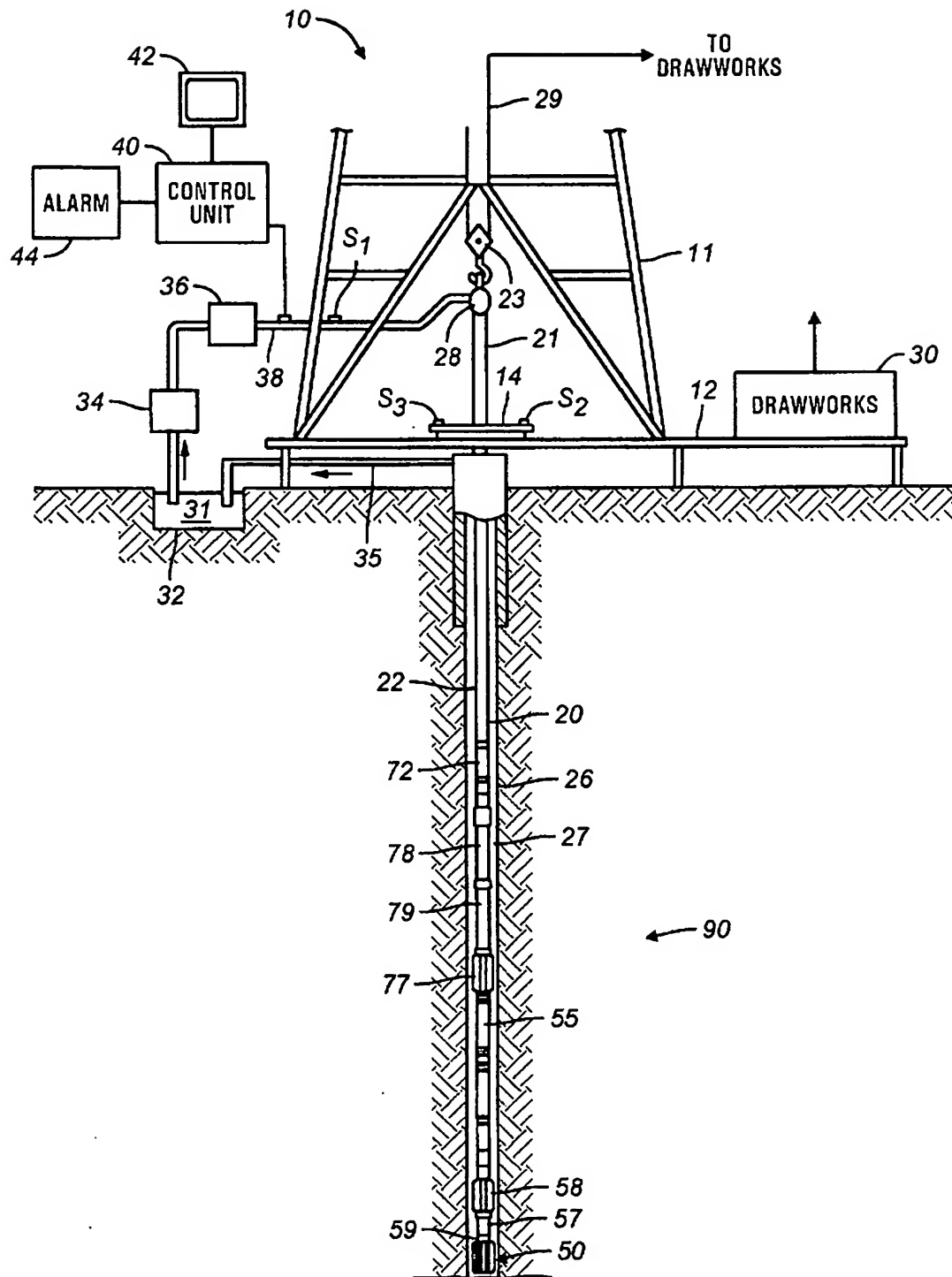
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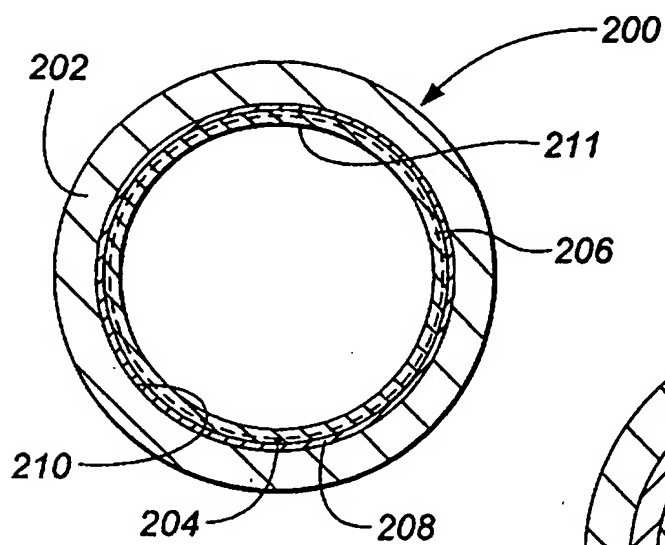
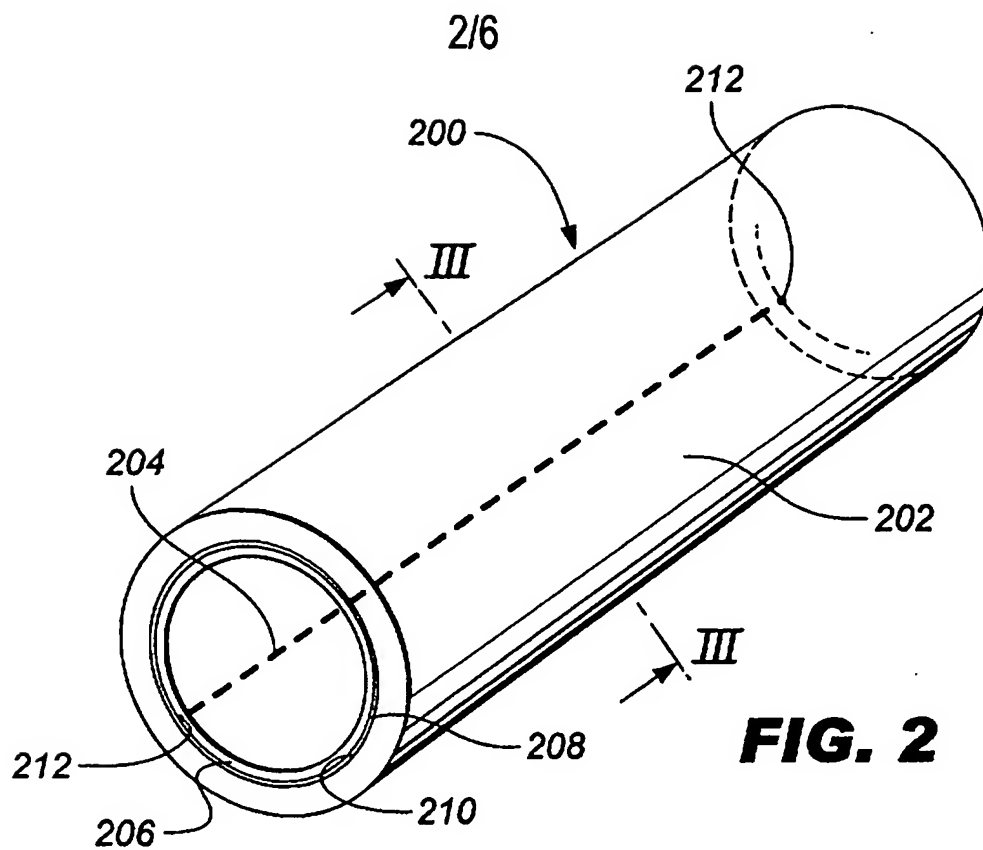
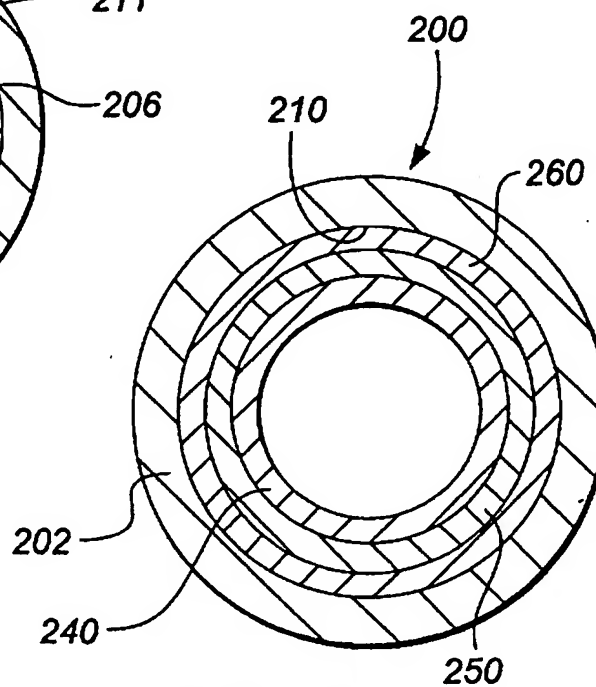
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EXTRA SET DRAWINGS (6 SHEETS) - FOR PTO EXAMINER

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**FIG. 1**

**FIG. 3****FIG. 4**

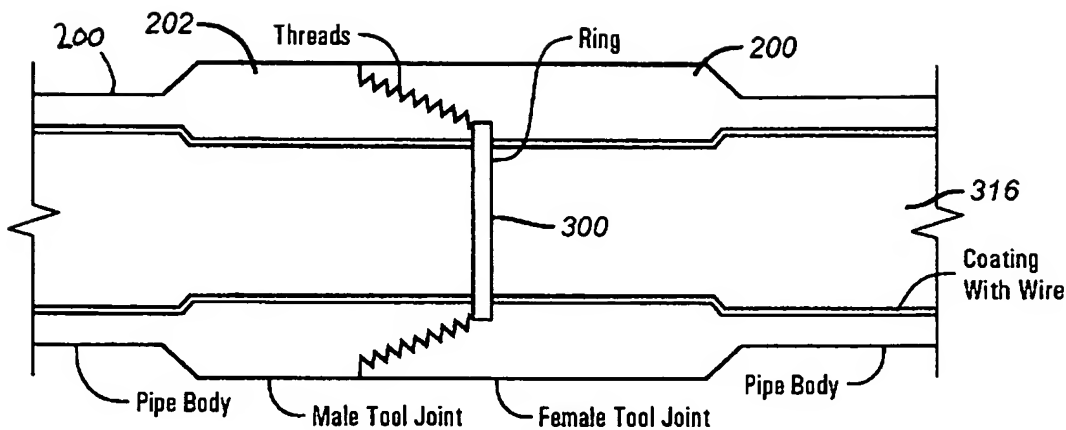


FIG. 5

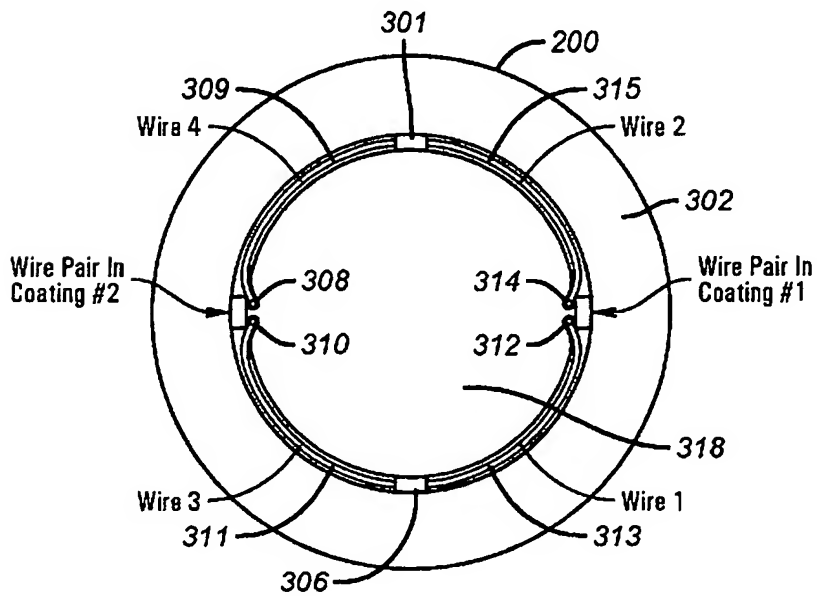
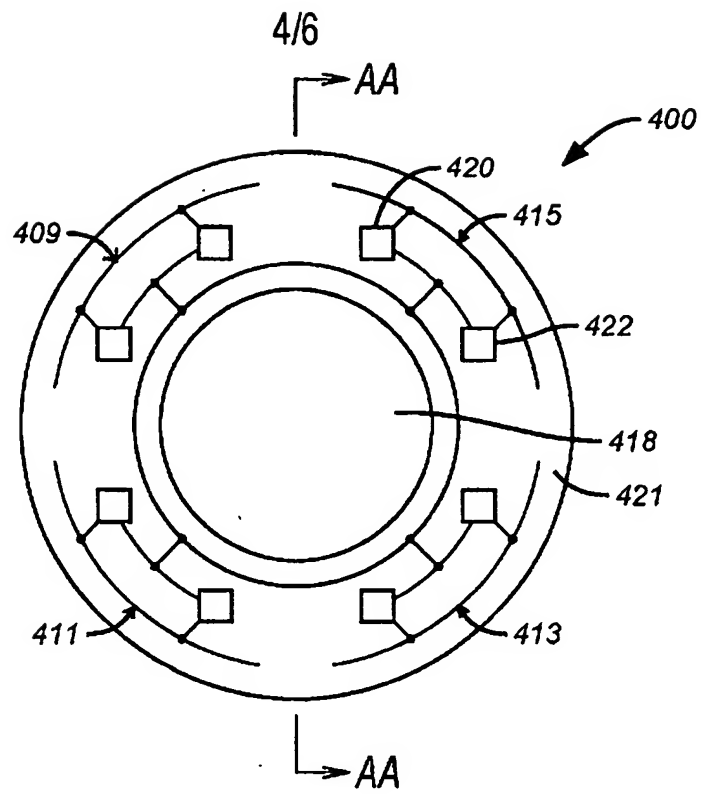
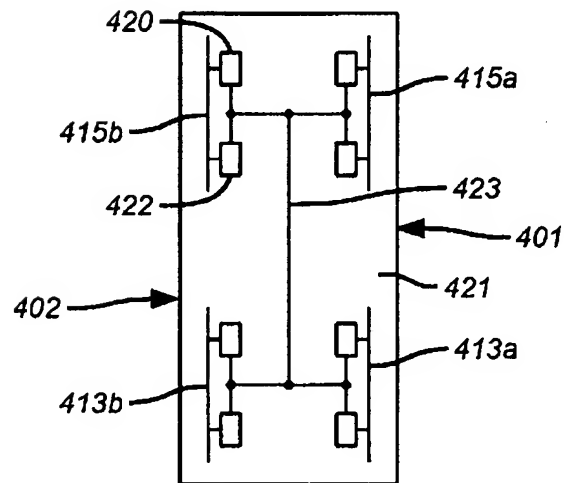
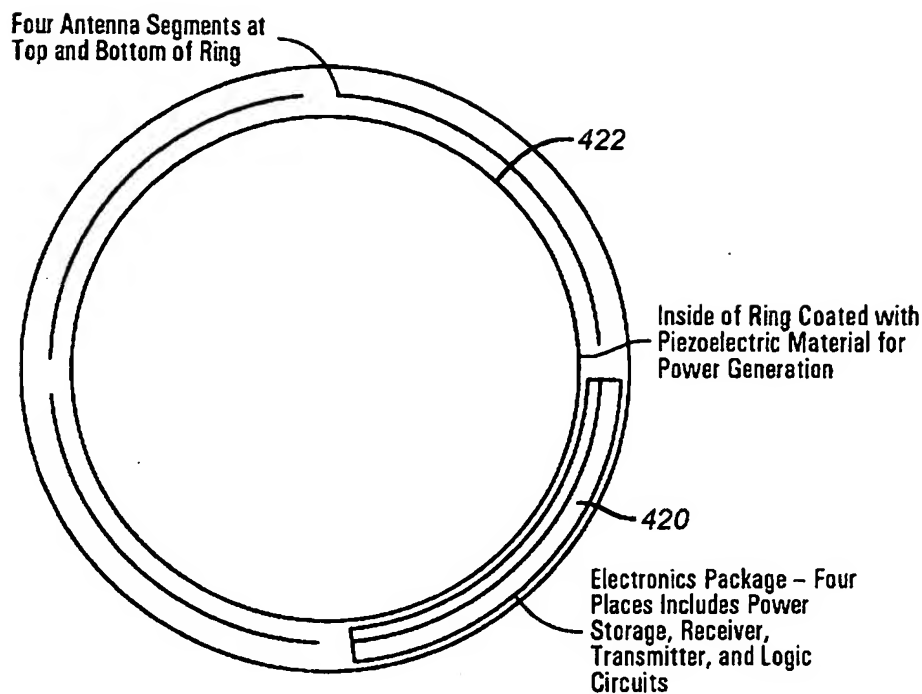
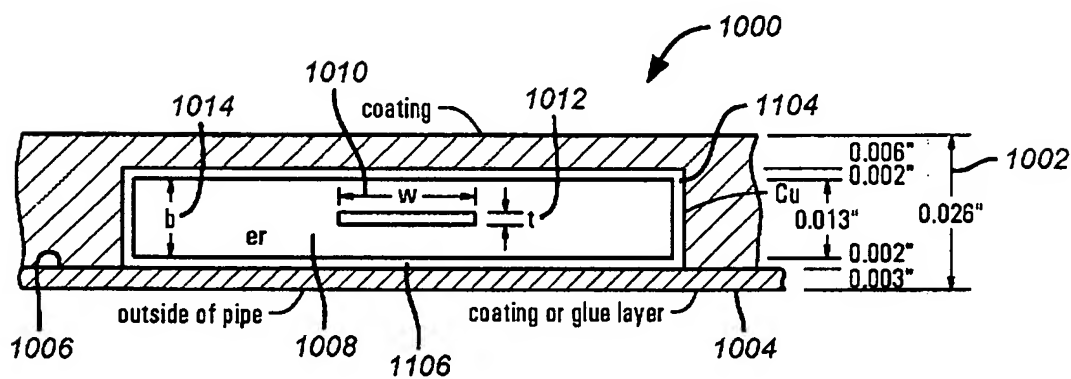
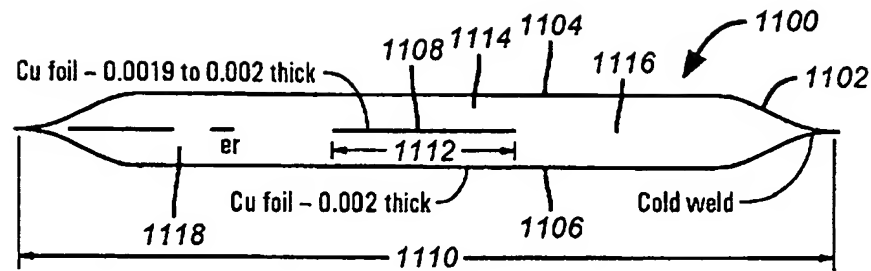


FIG. 6

**FIG. 7****FIG. 8**

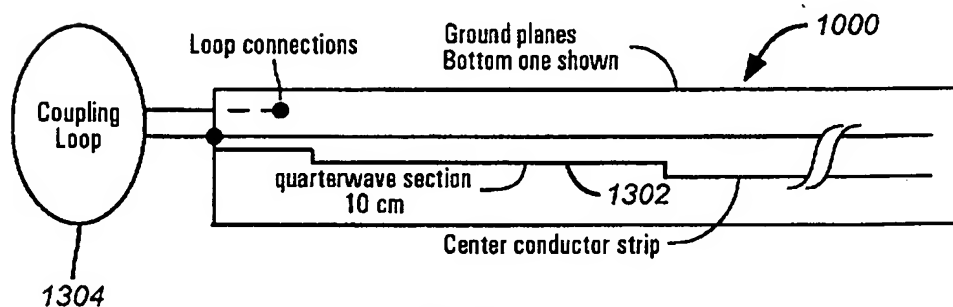
**FIG. 9****FIG. 10**

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**FIG. 11**

Characteristic Impedance of Full-Section Strip Transmission Line and Line Widths

Dielectric Constant = 2.1,			$(\epsilon_r)^{1/2} =$	1.45			Total Line
t/b	t	b	$\sim w/b$	w	Z ₀	$(\epsilon_r)^{1/2}Z_0$	Thickness
0.15	0.00195	0.013	0.255	0.0033	70.0	101.4	0.026
0.15	0.00195	0.013	0.550	0.0072	50.0	72.5	"
0.15	0.00195	0.013	0.825	0.0107	40.0	58.0	"
0.15	0.00195	0.013	0.920	0.0120	37.5	54.3	"
0.15	0.00195	0.013	1.650	0.0215	25.0	36.2	"
0.15	0.00195	0.013	2.200	0.0286	20.0	29.0	"
0.15	0.00195	0.013	2.550	0.0332	17.5	25.4	"
0.13	0.00195	0.015	1.700	0.0255	25.0	36.2	0.028
0.12	0.00195	0.018	1.950	0.0312	22.5	32.6	0.029
0.10	0.0016	0.016	1.760	0.0282	25.0	36.2	0.029

FIG. 12**FIG. 13**